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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,224	09/26/2003	Karen E. Petzold	LM(F)6455	4287

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EXAMINER	
ODOM, CURTIS B	

ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 11/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/672,224	PETZOLD ET AL.	
	Examiner	Art Unit	
	Curtis B. Odom	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 4, 5, and 17 are objected to because of the following informalities:

a. Claims 4 and 5 should end in a period.

b. In claim 17, the phrase "non-consecutive pulse sum" is suggested to be changed to "non-consecutive pulse sums".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the limitation "A method of detecting at least one signal of interest within an input signal". Claim 13 recites the limitation "A computer program product...that detects at least one signal of interest within an input signal". Claim 9 recites the limitation "A cross-correlation detection system". However, claims 1 and 13 do not recite how or when the signal of interest is detected. Claim 9 does not recite when the cross-correlation is detected. Thus, claims 1-20 are indefinite for failing to define when or how the signal or cross-correlation

is detected. One of ordinary skill in the art would not be enabled to detect the signal of interest or cross-correlation without definition of how to perform this function.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 2, 9, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sternberg et al. (U. S. Patent No. 7, 103, 339) in view of Cowie et al. (U. S. Patent No. 6, 717, 992).

Regarding claim 1, Sternberg et al. discloses a method of detecting at least one signal of interest within an input signal (see Fig. 2), comprising:

multiplying successively (see Fig. 2, block 24-2 and Fig. 5) at least one set of oversampled correlated vector (R) from the input signal by at least one set of vectors representing a complex conjugate of the input signal (as described in column 3, lines 42-46 and column 4, lines 28-37) to obtain a series of correlations represented by complex numbers (see column 3, lines 42-46);

summing (Fig. 5, S1 and S2) sets of one or more consecutive conjugation products (complex numbers) to obtain a series of sums (see column 3, lines 42-45); and

accumulating (integrating), see Fig. 2, block 24-3. a plurality of product sums over N-frames (see column 3, lines 48-56) to obtain a search value (peak/largest value), wherein it is the understanding of the Examiner that integration as recited in the claims is simply summation/accumulation (see instant specification page 20, lines 19-22).

Sternberg et al. does not disclose accumulating (integrating) a plurality of non-consecutive pulse sums (complex numbers) to obtain the value to be searched.

However, Cowie et al. discloses integrating (accumulating) consecutive pulses in a repeating pulse train to detect a data bit (see column 7, lines 54-60). Cowie et al. further discloses pulses from each repeating pulse train can be pseudo-randomly chosen (non-consecutively) (see column 8, lines 4-11) to produce an intermediate signal which is integrated to detect data bits (see column 8, lines 15-18). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the detection method/apparatus of Sternberg et al. and accumulate/integrate non-consecutive detection values (pulses) as taught by Cowie et al. since Cowie et al. states integration of pulses representing different detection values can be performed in parallel (simultaneously) by integrating pseudo-random (non-consecutive) pulses of repeating pulse trains (see column 8, lines 4-11).

Regarding claim 2, Sternberg et al. further discloses comparing (Fig. 2, block 24-6) the peak/magnitude (search) value to a predetermined threshold value (see column 3, lines 57-65) to detect multipath components of the received signal.

Regarding claim 9, Sternberg et al. discloses a cross-correlation detection system (see Fig. 2), comprising:

a digital multiplier for multiplying successively (see Fig. 2, block 24-2 and Fig. 5) at least one set of oversampled correlated vector (R) from the input signal by at least one set of vectors representing a complex conjugate of the input signal (as described in column 3, lines 42-46 and column 4, lines 28-37) to obtain a series of correlations represented by complex numbers (see column 3, lines 42-46);

a summer for summing (integrating) (Fig. 5, S1 and S2) sets of one or more consecutive conjugation products (complex numbers) to obtain a series of sums (see column 3, lines 42-45); and

an accumulator for accumulating (integrating), see Fig. 2, block 24-3, a plurality of product sums over N-frames (see column 3, lines 48-56) to obtain a search value (peak/largest value), wherein it is the understanding of the Examiner that integration as recited in the claims is simply summation/accumulation (see instant specification page 20, lines 19-22).

Sternberg et al. does not disclose accumulating (integrating) a plurality of non-consecutive pulse sums (complex numbers) to obtain the value to be searched.

However, Cowie et al. discloses integrating (accumulating) consecutive pulses in a repeating pulse train to detect a data bit (see column 7, lines 54-60). Cowie et al. further discloses pulses from each repeating pulse train can be pseudo-randomly chosen (non-consecutively) (see column 8, lines 4-11) to produce an intermediate signal which is integrated to detect data bits (see column 8, lines 15-18). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the detection method/apparatus of Sternberg et al. and accumulate/integrate non-consecutive detection values (pulses) as taught by Cowie et al. since Cowie et al. states integration of pulses representing different detection values

can be performed in parallel (simultaneously) by integrating pseudo-random (non-consecutive) pulses of repeating pulse trains (see column 8, lines 4-11).

Regarding claim 10, Sternberg et al. further discloses comparing (Fig. 2, block 24-6) the peak/magnitude (search) value to a predetermined threshold value (see column 3, lines 57-65) to detect multipath components of the received signal.

6. Claims 7, 8, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sternberg et al. (U. S. Patent No. 7, 103, 339) in view of Cowie et al. (U. S. Patent No. 6, 717, 992) as applied to claims 1 and 9, and in further view of Hiramatsu (U. S. Patent No. 5, 841, 400).

Regarding claim 7, Sternberg et al. and Cowie et al. do not disclose the set of input signal samples are derived from the input signal as it is received at a first location, and the set of complex conjugate samples is derived from the input signal as it is received at a second location.

However, Hiramatsu discloses estimation of a desired signal direction (see column 6, lines 44-50) which includes a set of input samples output from A/D converters (see Fig. 2, block 13) which are derived from an input signal received at a first antenna (see Fig. 2, block 11_1), and a set of complex conjugate samples output from Fig. 2, block 14 which are derived from the input signal received at a second antenna (see Fig. 2, block 11_2). The input samples and complex conjugate of the input signals are then multiplied (see Fig. 2, block 15, see column 7, lines 17-32), a multiplication process which is similar to that of Sternberg et al. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the detection method/apparatus of Sternberg et al. and Cowie et al. to derive the input samples and complex conjugate of the input samples from different antennas as disclosed by Hiramatsu

to allow estimation of the direction of a desired signal by a small calculation amount (see Hiramatsu, column 2, lines 40-42).

Regarding claim 8, Hiramatsu further discloses the desired signal is associated with a signal source (see column 1, lines 30-35), having an associated broadside direction in relation to the antennas (as described in column 7, lines 53-61 and column 8, lines 15-19), and the associated direction is determined from a phase angle value θ associated with the input signal (see column 8, lines 15-19). It would have been obvious to include these features to allow estimation of the direction of a desired signal by a small calculation amount (see Hiramatsu, column 2, lines 40-42).

Regarding claim 11, Sternberg et al. and Cowie et al. do not disclose the system implemented as part of an interferometer that determines the direction of a detected signal.

However, Hiramatsu discloses estimation of a desired signal direction (see column 6, lines 44-50) which includes a set of input samples output from A/D converters (see Fig. 2, block 13) which are derived from an input signal received at a first antenna (see Fig. 2, block 11_1), and a set of complex conjugate samples output from Fig. 2, block 14 which are derived from the input signal received at a second antenna (see Fig. 2, block 11_2). The input samples and complex conjugate of the input signals are then multiplied (see Fig. 2, block 15, see column 7, lines 17-32), a multiplication process which is similar to that of Sternberg et al. From the multiplication a desired signal direction is detected (see Fig. 2, block 16, column 8, lines 15-19) Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the detection method/apparatus of Sternberg et al. and Cowie et al. to detect the

direction of a desired signal as disclosed by Hiramatsu to allow estimation of the direction of a desired signal by a small calculation amount (see Hiramatsu, column 2, lines 40-42).

7. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sternberg et al. (U. S. Patent No. 7, 103, 339) in view of Cowie et al. (U. S. Patent No. 6, 717, 992) as applied to claims 9 and 10, in further view of Froelich et al. (U. S. Patent No. 6, 178, 197).

Regarding claims 13 and 14, Sternberg et al. and Cowie et al. disclose the functions of claim 13 (see rejection of claim 9) and the functions of claim 14 (see rejection of claim 10). However, Sternberg et al. and Cowie et al. do not disclose these functions written as a computer program product, operative in a data processing system.

However, Froelich et al. discloses a method/apparatus for searching/detecting a digital signal including correlation and integration (see column 7, lines 63-column 8, line 12). Froelich et al. further discloses the method/apparatus can be implemented in a microprocessor as computer program instructions (see column 16, lines 3-22). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to implement the functions of Sternberg et al. and Cowie et al. as computer program instructions for a microprocessor as disclosed by Froelich et al. since Froelich et al. states microprocessors are simple, inexpensive hardware components (see column 2, lines 30-35).

8. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sternberg et al. (U. S. Patent No. 7, 103, 339) in view of Cowie et al. (U. S. Patent No. 6, 717, 992), in view of Hiramatsu (U. S. Patent No. 5, 841, 400) as applied to claims 7 and 8, and in further view of Froelich et al. (U. S. Patent No. 6, 178, 197).

Regarding claims 19 and 20, Sternberg et al., Cowie et al., and Hiramatsu disclose the functions of claim 19 (see rejection of claim 7) and the functions of claim 8 (see rejection of claim 20). However, Sternberg et al., Cowie et al., and Hiramatsu do not disclose these functions written as a computer program product, operative in a data processing system.

However, Froelich et al. discloses a method/apparatus for searching/detecting a digital signal including correlation and integration (see column 7, lines 63-column 8, line 12). Froelich et al. further discloses the method/apparatus can be implemented in a microprocessor as computer program instructions (see column 16, lines 3-22). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to implement the functions of Sternberg et al., Cowie et al., and Hiramatsu as computer program instructions for a microprocessor as disclosed by Froelich et al. since Froelich et al. states microprocessors are simple, inexpensive hardware components (see column 2, lines 30-35).

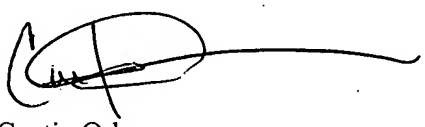
Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nishio (US 2002/0169601) discloses correlation of non-consecutive samples.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Curtis Odom
November 7, 2006